

Palaeosiphonium, a problematic Jurassic alga

G. F. Elliott

Department of Palaeontology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Synopsis

'*Pseudocodium*' *convolvens* Pratulron 1964, a problematic Tethyan Jurassic alga, is re-examined from English materials and interpreted from its structure as very probably an extinct member of the 'siphonous Chlorophycophyta', but a family assignment is not attempted. The name *Pseudocodium* being preoccupied by a living alga, the fossil is renamed *Palaeosiphonium*. Distribution and range are summarized: it is both Tethyan and extra-Tethyan geographically, and Upper Bathonian to bottom Callovian stratigraphically.

Introduction

The problematic microfossil discussed here was described by Pratulron (1964) from the Jurassic (Upper Dogger or Malm) of central Italy. He regarded it as algal, though peculiar in structure, and named the species *Pseudocodium convolvens*. Farinacci & Radoičić (1964: pl. 6) and Radoičić (1966: pl. 8) recorded the species from the Upper Bathonian–bottom Callovian of Yugoslavia. Pratulron (1966) recognized that the generic name *Pseudocodium* was preoccupied by a Recent alga (*Pseudocodium* Weber van Bosse 1896), but in view of the taxonomic uncertainty over the fossil, he did not rename it. Elliott (1975) recorded it from the Upper Bathonian of England, where it is a rare fossil, and drew attention to an alga figured by Hudson (1970) from the Middle Jurassic of Scotland, which showed some similarity although the evidence was too limited for a positive identification. Mišik (1979) listed Pratulron's species from Czechoslovakia, in a remanié pebble found in the Cretaceous.

A further find in England provides the occasion for a fresh evaluation of this organism, and the opportunity is taken to rename it.

The figured material is in the Department of Palaeontology, British Museum (Natural History). Figs 1–4.

Description

PALAEOSIPHONIUM, nom. nov.

[= *Pseudocodium* Pratulron 1964, *non* Weber van Bosse 1896]

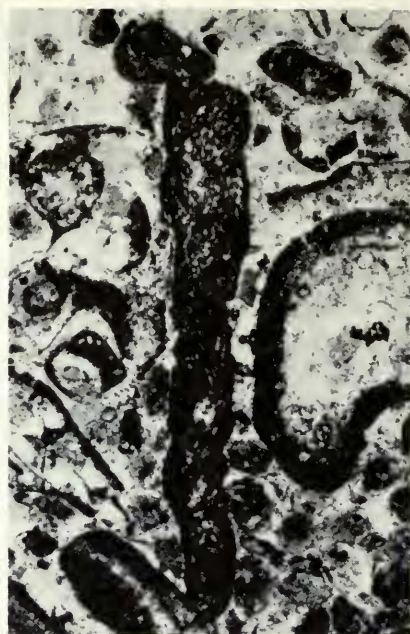
GENERIC DIAGNOSIS. Elongate slender cylindrical or subfusiform calcareous bodies, showing irregular external constrictions of diameter. Central medullary zone with tendency to recrystallization, main medullary zone showing a longitudinally directed tangle of apparently tubular threads, very confused subperipherally, where it is possible that they may branch and anastomose, but without marked diameter diminution. The whole complex is enclosed by a single subdermal tubular thread, which winds spirally from end to end of the body, without communicating throughout its main length with the inner complex. Calcification moderately heavy, completely enclosing these structures.

TYPE SPECIES. *Palaeosiphonium convolvens* (Pratulron) Elliott.

DISCUSSION. This curious fossil was described in detail in Pratulron's original account (1964); he was careful to give a factual account separate from interpretation. The medullary



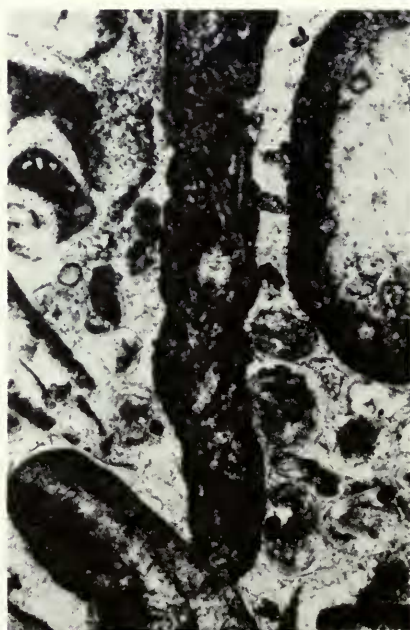
1



2



3



4

Figs 1-4 *Palaeosiphonium convolvens* (Praturlon) Elliott. Middle Jurassic, Upper Bathonian, Hodsoni Zone; Cirencester area, Gloucestershire, England. Fig. 1, longitudinal-tangential section showing outer spiral. V57651, $\times 30$; Daglingworth Quarry. Fig. 2, longitudinal section showing medullary thread-system in various aspects, due to plane of section cutting irregularities of unit. Outer spiral mostly missing due to worn state of unit. V62034, $\times 18$; Fowler's Hill, Quenington. Figs 3, 4, portions of specimen seen in Fig. 2, $\times 27$, to show detail.

structure could be one of many variants of that found in the serial-segmented Udoteaceae (Codiaceae auctt.), and in a general way recalls *Arabicodium* or *Palaeoporella*. The outer spiral is however quite anomalous for this group. Inevitably it brings to mind the spiral structures seen in the Charophyta, particularly those of the calcified reproductive bodies ('oogonia'). However, these spirals develop from several cells each originating its own spiral curve, and the result is not a single spiral. The internodal spirals of the Jurassic *Echinochara* are also multiple in origin. *Palaeosiphonium* cannot in any way be homologized with the Charophyta. Praturlon believed his fossil to be algal, with which I agree, but he left it *incertae sedis*.

If one considers the gross morphology of various living genera of 'siphonous' green algae, irrespective of their allocation in detailed higher classification, which is based on all evidence including cell-structure and biochemistry not available in fossils, there exists a considerable variety of general form and structure. *Ernodesmis* shows clusters of branches; *Udotea* shows a fan formed of coarse longitudinal threads bound together by subsidiary laterals, while in *Anadyomene* the fan is formed of large, dividing longitudinal elements, intersticed closely with tiny laterals. *Penicillus* shows a stalked tufted head of beaded longitudinals, *Chamaedoris* a stalked cup of felted threads, and the familiar *Halimeda*, with medullary longitudinals and dividing cortical utricles, typifies the serial-segmented pattern.

I suggest that *Palaeosiphonium* is yet another variant. The remains as found (probably serial-segments but just possibly single individuals), would not calcify until fully or almost fully grown, as in *Halimeda*. In the green, growing phase the threads would have proliferated as a tangled longitudinal bundle, but with one thread individualized on an outer, spiral, course. Irregularities in growth would lead to its occasionally constricting the loose, growing structure, and this would be correlated with the absence of a mass of peripheral utricles as in the advanced *Halimeda*. Eventually the structure would have calcified, giving the remains found fossil.

Detailed serial sections of the terminations of exceptionally well-preserved examples are necessary to check the genesis and termination of the spiral, and suitable material is not available to me. But this explanation seems the most likely. If it is correct, then the extinct *Palaeosiphonium* is certainly a green alga within the 'siphonous Chlorophycophyta complex' (Egerod 1952). Family allocation is nearly impossible, however, unless the view is taken that it should be made the type of a new monogeneric family. The biological details available for the living taxa, and used in various classifications, are much greater than those to be seen in the fossil, and in this case the similarities are insufficient for other than a very general allocation.

Geological age of *Palaeosiphonium*

The two English examples which led to this restudy are slightly smaller in unit- and thread-dimensions than the type material, but otherwise they correspond. They come from localities about 15 km apart near Cirencester, Gloucestershire, southern England. The algal level at one locality, Daglingworth, can be dated on ammonite evidence as referable to the Hodsoni Zone of the Upper Bathonian (Torrens, in Cope *et al.* 1980: 35). The algal level at the other locality seems to be in the same stratigraphic position; at both localities *Palaeosiphonium* is accompanied by the algae *Dobunniella coriniensis* Elliott, *Sarfatiella dubari* Conrad & Peybernès, *Pycnoporidium* sp., *Solenopora jurassica* Brown and various cyanophytes. In the same mid-Cotswold region the well-known *Solenopora* occurrences of Foss Cross quarry (Harland & Torrens 1982) and the adjacent railway-cutting are also at this approximate level.

Taken in conjunction with the Mediterranean occurrences, *Palaeosiphonium* seems to occur in the upper part of the Middle Jurassic (Upper Bathonian–bottom Callovian). In geographical distribution it is both Tethyan and extra-Tethyan (Elliott 1977), though rare in the latter. Reasons for this distribution in other tropical algae have been discussed by me recently (Elliott, in press).

References

- Cope, J. W. C., Duff, K. L., Parsons, C. F., Torrens, H. S., Wimbledon, W. A. & Wright, J. K. 1980. A Correlation of Jurassic rocks in the British Isles. Pt. 2. Middle and Upper Jurassic. *Spec. Rep. geol. Soc. Lond.*, **15**. 109 pp.
- Egerod, L. E. 1952. An analysis of the siphonous Chlorophycophyta, with special reference to the Siphonocladales of Hawaii. *Univ. Calif. Publs Bot.*, Berkeley, **25**: 325–454.
- Elliott, G. F. 1975. Transported algae as indicators of different marine habitats in the English Middle Jurassic. *Palaeontology*, London, **18**: 351–366.
- 1977. Inferred isocrymal distribution of Jurassic dasycladacean algae in Europe, north Africa and southwestern Asia. *J. geol. Soc. Lond.*, **133**: 363–373.
- (in press). Climatic tolerance of some aragonitic green algae in the post-Palaeozoic. *Palaeogeogr. Palaeoclimatol. Palaeoecol.*, Amsterdam.
- Farinacci, A. & Radoičić, R. 1964. Correlazione fra serie giuresi e cretacee dell'Appennine centrale e delle Dinaride esterne. *La Ric. scient.*, Rome, **34** (II-A): 269–300.
- Harland, T. L. & Torrens, H. S. 1982. A redescription of the Bathonian red alga *Solenopora jurassica* from Gloucestershire, with remarks on its preservation. *Palaeontology*, London, **25**: 905–912.
- Hudson, J. D. 1970. Algal limestones with pseudomorphs after gypsum from the Middle Jurassic of Scotland. *Lethaia*, Oslo, **3**: 11–40.
- Mišik, M. 1979. Jurassic and Cretaceous Algae (Dasycladales excepted) from the West Carpathians. *Bull. Cent. Rech. Explor.-Prod. Elf-Aquitaine*, Pau, **3**: 705–712.
- Praturlon, A. 1964. Calcareous algae from Jurassic-Cretaceous limestone of central Apennines (Southern Latium-Abruzzi). *Geologica romana*, **3**: 171–202.
- 1966. Algal assemblages from Lias to Paleocene in Southern Latium-Abruzzi: a review. *Boll. Soc. geol. ital.*, Rome, **85**: 167–194.
- Radoičić, R. 1966. Microfacies du Jurassique des Dinarides externes de la Yougoslavie. *Geologija*, Ljubljana, **9**: 5–377.
- Weber van Bosse, A. 1896. On a new genus of Siphonous algae – *Pseudocodium*. *J. Linn. Soc.*, London, (Bot.) **32**: 209–212.